

### REMARKS

This Amendment and Response to Office Action is submitted in response to the Examiner's Office Action dated June 29, 2005. Favorable reconsideration of this application is respectfully requested for the reasons set forth in these remarks. Reconsideration of the application, as presently amended, is respectfully requested. Claims 1, 2, 4, 5, 7, 9, 11, 12, 13, 14, 15, and 18 have been amended for clarity purposes and not for any reason related to the statutory requirements for patentability. Claims 21 through 23 are canceled without prejudice and Applicants retain the right to present Claims 21 through 23 in a continuation application. Thus, Claims 1 – 20 are now pending.

*I. Claim Rejection - 35 U.S.C. § 112, first paragraph*

Claims 11 through 14 are rejected under 35 U.S.C. § 112, first paragraph, because the specification does not reasonably provide enablement for any article other than silicon wafers. Those skilled in the art recognize that the term "silicon wafers" is commonly used to include wafers made silicon or its derivatives, such as quartz (silicone dioxide). Accordingly, these claims have now been amended to refer only to silicon and quartz. Accordingly, each of the claims is properly enabled by the specification and the Applicants respectfully request that claims 11 through 14 are in a condition for allowance.

Claims 21 through 23 are rejected under 35 U.S.C. § 112, first paragraph, because the certain elements recited in the claims that are critical or essential to the practice of the invention are not enabled by the disclosure. These claims have been canceled without prejudice.

## II. Claim Rejection - 35 U.S.C. § 102

Claims 11 through 14 are rejected under 35 U.S.C. § 102 as being anticipated by clean dishes or, alternatively, by any semiconductor wafer cleaned by any conventional industry method. The Examiner asserts that any article which does not have organic or organometallic material thereon meets the claimed limitations.

Claims 11 through 14 describe an article, or product, made by a specified process. Such "product-by-process" claims define the product in terms of the process used to make the product. It is well established that a product claim may be drafted to include process steps to wholly or partially define the claimed product. *See, e.g., In re Hallman*, 655 F.2d 212, 215 (C.C.P.A. 1978). A product-by-process claim is particularly useful when there are product claims where the method or steps cause something to be produced. *See Faber, Robert C., Landis on Mechanics of Patent Claim Drafting*, Section 46. In fact, to the extent that the alleged invention is present in a process or method of producing the product, a claim drawn to that process or method is the only appropriate means of protection. *See Clairol, Inc. v. Brentwood Industries, Inc.*, 193 U.S.P.Q. 683 (C.D. Cal. 1976).

In the present case, the product-by-process Claims 11 through 14 define the product, a clean silicon article, by the process used to clean it. As in *Clairol*, the invention in this case is present in the process of producing the cleaned silicon article. Specifically, the cleaned silicon article is produced through the process of (a) creating a vacuum of about 50 mtorr to about 1500 mtorr in a chamber containing an oxygen-containing gas; (b) placing said silicon article including the organic or organometallic materials in said chamber; (c) irradiating said organic or organometallic materials and said oxygen-containing gas within said chamber with vacuum ultraviolet light radiation having a wavelength of about 172 nm; and (d) removing said organic

or organometallic materials from said silicon article utilizing the ozone and activated oxygen produced in step (c). Accordingly, a product made through the claimed process is not anticipated by articles without organic or organometallic material thereon and the Applicants respectfully request that this rejection be removed.

### ***III. Claim Rejection – 35 U.S.C. § 103***

Claims 1 through 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over any one of U.S. Patent No. 6,409,842 (the “‘842 Patent”) and U.S. Patent No. 6,631,726 (the “‘726 Patent”). The Examiner asserts that both the ‘842 Patent and the ‘726 Patent teach that it was known to remove contaminants by action of UV in the wavelength claimed by Applicant generated by the claimed sources in a vacuum chamber in the presence of the claimed gasses. The Examiner acknowledges that both of the cited patents are silent as to the pressure range in which the contaminant removal occurs.

#### ***Discussion of Cited Art***

A better understanding of the reasons Applicant believes that Applicant’s invention is patentable over each of the ‘842 Patent and the ‘726 patent can be obtained by more closely examining the cited art.

The ‘842 Patent discloses a process for cleaning of substrate surfaces, or coating substrate surfaces, by irradiating a surface with a radiation wavelength between 60 nm and 350 nm. The ‘842 patent is directed towards and teaches a method for uniformly illuminating the irradiated surface. The ‘842 Patent does not disclose or teach a process for cleaning substrate surfaces in which both the ultraviolet radiator and the substrate are placed within a vacuum. The specification is clear that “high-power radiators are to be used insofar as possible according to

the state of the art cited in the beginning.” ‘842 Patent, col. 2, lines 26 – 30. All of the UV radiation devices described in the specification are conventional lamps and there is no discussion in the specification that a UV lamp capable of withstanding sub-atmospheric pressure could be used. Further, there is no teaching within the specification of any means by which a sub-atmospheric lamp could be created or integrated into the system. In fact, at the only point in the specification where the inventors disclose that “it is possible . . . to perform the process in a vacuum or reduced pressure,” they quickly qualify this teaching with the statement “in which case, the substances being used in forming the radical molecules are placed in the area between the ultraviolet radiator and the substrate surface.” ‘842 Patent, col. 3, lines 4 - 6. This qualification is necessary because the inventors in the ‘842 Patent do not contemplate that the lamp and the substrate would both be placed in the vacuum chamber.

In addition to the lack of written support for an interpretation that the lamp could be included in a vacuum chamber with the substrate to be cleaned, there is no support in the drawings. The drawings showing a cleaning system both with and without a radiation lamp, but do not show a system in which the radiation lamps and the substrate are enclosed within a vacuum chamber. Rule 83(a) provides that “the drawing must show every feature of the invention specified in the claim.” 37 C.F.R. § 1.83(a). There is simply no basis to conclude from the specification of the ‘842 Patent that it was known in the art that one could successfully incorporate both a ultraviolet radiation lamp and a substrate within a vacuum system.

The ‘726 Patent discloses an apparatus and method for cleaning a substrate using a dielectric discharge lamp in the presence of a moistened inert gas. Although the ‘726 Patent describes the use of ultraviolet light radiation of 172 nm generated from the dielectric discharge lamp, there is no discussion within the specification of performing the process in a vacuum

chamber. In fact, the process described in the '726 Patent is necessarily performed in an open chamber. For example, the chamber described in the '726 Patent includes "entrance and exit openings which are provided at upstream and downstream ends." Such "openings" in the system would be entirely antagonistic to a chamber designed to operate in sub-atmospheric pressures. If the inventors had intended for the process- including both the radiation lamp and the substrate - to be conducted in a vacuum, they would have provided a description of how the system would be designed so as to maintain a vacuum during processing, including a discussion of how the conventional radiation lamps contemplated in the invention could withstand sub-atmospheric pressures. In short, the cleaning process disclosed in the '726 Patent is entirely different than the process taught in the Applicant's application.

One final note before proceeding to the application of the law to the above discussion of the cited art. The prior art discloses the use of 172 nm ultraviolet light to clean a substrate and also discloses the placement of the substrate in a vacuum during the cleaning process. The prior art does not disclose the placement of *both* the ultraviolet light *and* the substrate in the same vacuum chamber. Any such disclosure would necessarily contain a discussion of a non-conventional radiation lamps – one that is capable of withstanding sub-atmospheric pressures. The Examiner indicates in the Office Action that "the recitation of the vacuum together with recitation of specific reaction gasses encompasses the claimed range." While it may have been obvious for one skilled in the art to adjust the pressure in the chamber containing the substrate to be treated, there is simply no indication that the vacuum chambers referred to in the prior art were intended to encompass the radiation lamp as well as the substrate. If so, the specification would have included a discussion of ways by which the light was able to withstand the vacuum without exploding.

The Examiner also states that "it would have been obvious to an ordinary artisan at the time the invention was made to find an optimum pressure in the methods disclosed by [the '842 Patent] and [the '726 Patent] by routine experimentation and to make the apparatuses disclosed by these documents operating at such optimum pressures in order to enhance the treatment." While it may have been routine to adjust the pressure in the chamber containing the substrate in the '842 Patent, there is simply no suggestion in either patent to include the radiation lamp in the same chamber as the substrate. If so, it would have been necessary to monitor the effect of pressure changes both on the radiation lamp (e.g. to see what pressure changes it can withstand) and the efficacy of the cleaning process and such a description is not present in the prior art.

Accordingly, Applicants respectfully assert that the present invention is patentable over each of the '842 Patent and the '726 Patent for at least the reasons set forth below.

***No Basis in the Art for Combining References***

First, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching, suggestion or incentive supporting the combination. *ACS Hospital Systems, Inc. v. Monteffiore Hospital*, 732 F. 2d 1572, 1577 (Fed. Cir. 1984). In fact, the Federal Circuit has recently held:

"most, if not all, inventions arise from a combination of old elements. . . . Thus, every element of a claimed invention may often be found in the prior art. However, identification in the prior art of each individual part claimed is insufficient patentability of the whole claimed invention. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant."

*In re Kotzab*, 217 F.3d 1365 (Fed. Cir. 2000).

Recently, in *In re Lee*, the court has cautioned against asserting that a combination of references was “common knowledge” or “common sense:”

“The ‘common knowledge and common sense’ on which the Board relied in rejecting *Lee*’s application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act. . . . The Board’s findings must extend to all material facts and must be documented on the record lest the ‘haze of so-called expertise’ acquire insulation from accountability. ‘Common knowledge and common sense,’ even if assumed to derive from the agency’s expertise, do not substitute for authority when the law requires authority.”

*In re Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002).

In the present case, neither the ‘842 Patent nor the ‘726 Patent teaches the use of a radiation lamp within the same vacuum chamber as the substrate. Incorporating the radiation lamp in the same chamber is significant for several reasons. First, because the radiation lamp and the substrate are in the same chamber, the radiation lamp can be located in closer proximity to the substrate, thereby providing a more intense and uniform radiation to the surface of the substrate. This results in more activated energy being focused on the article thereby increasing the efficacy of the process. Second, the energy transferred from the radiation lamp to the substrate is greater because there is nothing between the radiation lamp and the substrate to attenuate the energy. This increased energy transfer results in a more efficient and effective cleaning process. Third, because the lamp is located in the vacuum, it does not need to be cooled which can be a significant consideration in this type of cleaning process. If an inventor had intended to disclose or claim the incorporation of the radiation lamp into the substrate’s vacuum chamber, the process would have been disclosed in detail due to the significant advantages of such an invention. Accordingly, one of ordinary skill in the art who was looking to improve the cleaning of articles using radiation has not, and would not, consider incorporating the radiation

lamp into a vacuum chamber with the substrate to be cleaned. There is simply no teaching, suggestion or incentive to do so.

***References Are Not Properly Combinable If Their Intended Function Is Destroyed***

The Federal Circuit has consistently held that when a rejection under § 103 is based upon the modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and a *prima facie* case of obviousness cannot be made. *See, e.g., In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984) ("The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.").

In the present case, Applicant teaches and claims the cleaning of an article using radiation produced by a radiation lamp which is located in the same vacuum chamber as the article. The '842 Patent does not teach the placement of the radiation lamp in a vacuum. In fact, when the use of a vacuum is discussed in the '842 Patent, an explanatory note is added to clarify how the substances used to clean the substrate will be introduced since the radiation lamp and the substrate are now separated. The '726 Patent does not contemplate the placement of the radiation lamp in a vacuum because the system in which the cleaning process is performed is an open system. Accordingly, the desirability of placing the radiation lamp in a vacuum with the substrate was not suggested in either the '842 Patent or the '726 Patent and it would not have been obvious to one of ordinary skill in the art who was looking to improve the efficiency of the cleaning system to do so.

***Prima Facie Obviousness Requires A Reasonable Expectation of Success***

The courts require that some reason or suggestion must be found in the prior art or other evidence of record that would have led one of ordinary skill in the art to produce the claimed



invention in order to properly establish a *prima facie* case of obviousness. For example, in *In re Clinton*, 527 F.2d 1226, the CCPA stated that "obviousness does not require absolute predictability but a reasonable expectation of success is necessary." The court went on to say that, "in going from the prior art to the claimed invention, one cannot base obviousness upon what a person skilled in the art might try or might find obvious to try but rather must consider what the prior art would have led a person skilled in the art to do." Accordingly, obviousness cannot be surmised when there is no suggestion, or expressed expectation, of success in the prior art that would have led one to perform the experimentation in the first place.

As discussed above, neither the '842 Patent nor the '726 Patent disclose the placement of the radiation lamp in the same vacuum chamber as the substrate to be cleaned. Nowhere in either patent is there a suggestion or an expressed expectation that the radiation lamp would withstand sub-atmospheric pressures. Of course, conventional lamps will explode when placed in sub-atmospheric pressures. Because of the sensitive nature of the lamps generating the radiation, small changes in pressure can create problems with the ability of the lamp to function properly. If an inventor intended to place the radiation lamp in a vacuum, he would have necessarily made it a point to describe the obstacles to such a configuration and the benefits achieved as a result. In this case, there is simply no suggestion or expectation of success in the prior art for the placement of a radiation lamp in a vacuum.

#### **IV. Summary**

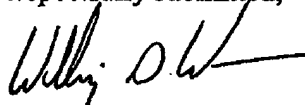
In view of the foregoing remarks, the Applicant respectfully submits that all pending claims are allowable over the art of record and respectfully requests a timely Notice of Allowance.

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A new power of attorney is transmitted herewith.

Respectfully submitted,



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